Dryden Flight Research Center

The World's Premiere Installation for Atmospheric Flight Research

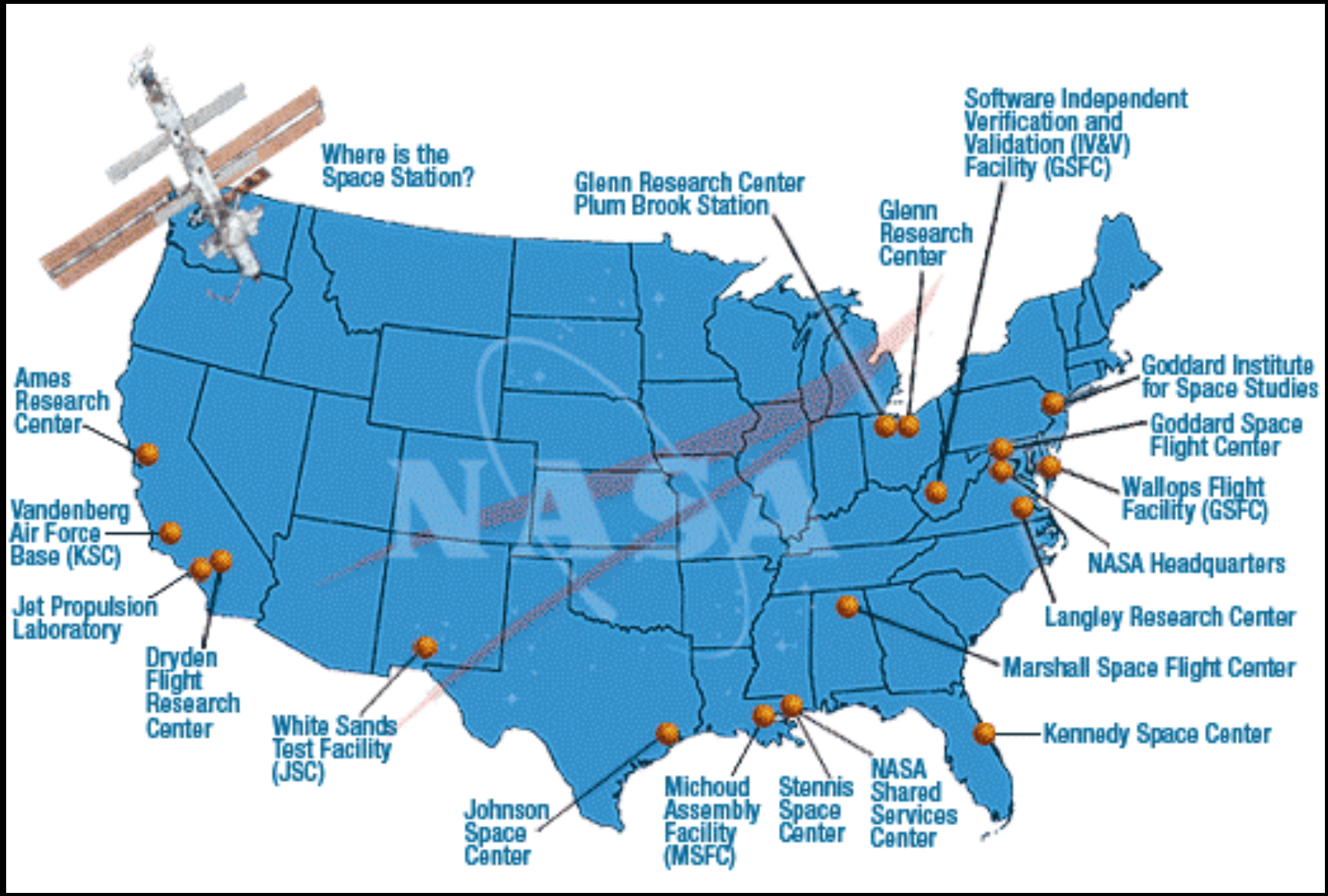
Our Namesake

The NASA Dryden Flight Research Center was named after Dr. Hugh L. Dryden, the first Deputy Administrator of NASA. The following is his explanation as to why there is a need for flight research,

“. . . to separate the real from the imagined and to make known the overlooked and the unexpected. . .”.

To Fly What Others Only Imagine

Location


Where is the Space Station?
Glenn Research Center Plum Brook Station
Glenn Research Center
Software Independent Verification and Validation (IV&V) Facility (GSFC)
Goddard Institute for Space Studies
Goddard Space Flight Center
Wallops Flight Facility (GSFC)
NASA Headquarters
Langley Research Center
Marshall Space Flight Center
Kennedy Space Center
NASA Shared Services Center
Stennis Space Center
Michoud Assembly Facility (MSFC)
Johnson Space Center
White Sands Test Facility (JSC)
Dryden Flight Research Center
Jet Propulsion Laboratory
Vandenberg Air Force Base (KSC)
Ames Research Center

Edwards Air Force Base
• Remote Location
• Varied Topography
• 350 Testable Days Per Year
• Extensive Range Airspace
• 29,000 Ft Concrete Runways
• 68 Miles of Lakebed Runways
• 301,000 Acres
• Supersonic Corridor
NASA Dryden Flight
Research Center

Dryden's Mission:

Advancing Technology and Science Through Flight

- **Mission Elements**:
  - Perform flight research and technology integration to revolutionize aviation and pioneer aerospace technology,
  - Validate space exploration concepts,
  - Conduct airborne remote sensing and science observations,
  - Support operations of the Space Shuttle and the ISS

… for NASA and the Nation.

Dryden's Role in NASA

Resource Provider

Decision Makers

Customers

- Policy Makers
- Science/Education
- Technologists
- Commercial sectors
- Aerospace Industry
- Government Agencies

National Aeronautics and Space Administration (NASA)

Mission Directorates

Agency Structure

Ultimate Beneficiary

Dryden Role

Summary of Capabilities
NASA Dryden Flight Research Center

- Core Competencies
  - Atmospheric Flight Research and Test
    - Flight Safety and Risk Management
    - Flight Project and Mission Management
    - Flight Research Technology
    - Flight Test Operations
    - Experimental Aircraft - piloted and unpiloted

  Facility Capability
  - Flight Operations & Engineering Staff
  - Experimental and Testbed Aircraft
  - Unmanned Aircraft Systems
    - Extensive experience in securing Certificates of Authorization (COA) for UAS flights
  - Airborne Science Platforms
  - Range and Aircraft Test Facilities
    - Western Aeronautical Test Range
    - Research Aircraft Integration Facility
    - Flight Loads Laboratory

  On-Going Partnerships
  - Other NASA Centers: ARC, GRC, LaRC, JSC, KSC, MSFC
  - DoD Partnerships: AFFTC Alliance, USN, AFRL, DARPA
  - Other Government Agencies: DOT, NOAA, DHS, …

FY07 Vital Statistics:	
Civil Servant Staff	530
On-site Contractors	~500
Budget	~$220M

Summary of Facilities

NASA Dryden Flight Research Center

- Research Aircraft Integration Facility (RAIF)
- Flight Loads Laboratory
- Flow Visualization Facility
- Flight Simulation Laboratory (“Sim Alley”)
- Meteorological Sensing and Prediction
- Experimental Fabrication and Repair
- Shuttle Support
- 2x Mission Control Rooms + TRAPS
- Western Aeronautical Test Range

Testbed Aircraft

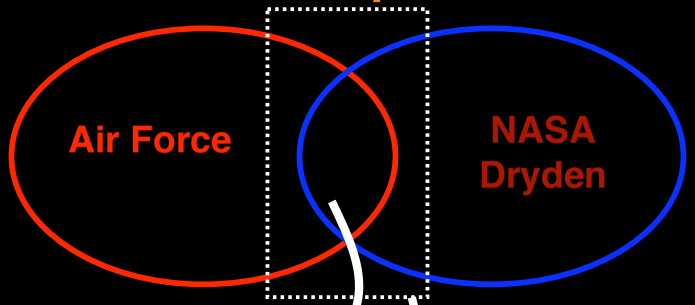
Testbed aircraft augmenting Dryden's one-of-a-kind research aircraft are available to support a wide variety of research missions. Predator, Global Hawk, F/A-18, F-15, T-38, T-34, King Air, and G-3 provide platforms for sensor validation, aerodynamic, system, and propulsion research and test.

Air Force/Dryden Alliance Activities

NASA/AFFTC/AFRL Alliance
- Co-chaired council meets quarterly
- 8 integrated product teams
- 33 active Memorandum of Agreements
- Over $86M in cost avoidance/savings to date

Preserves Unique Missions

Test & Evaluation Mission



Research & Technology Mission

Common Infrastructure
Airfield Operations
Range & Flight Safety
Shared Aircraft & Equipment
Frequency Management
Health & Welfare
Emergency Response
Security

1st 5 yrs

Fully integrated infrastructure with EAFB exists today

New Emphasis Areas
Program Collaboration
- X-37, UCAV, C-17, AAR

Sharing Staffing Resources
- Technicians and Shops
- Engineering
- Administrative

Current Research: Altair / Ikhana (new)

- Modified Predator-B UAV
- Environmental Research and Sensor Technology (ERAST) program
- Long-endurance/high-altitude: 32 hours @ 52,000 ft
- Over-the-horizon control, AI collision-avoidance demonstrator
- Observation, climate monitoring, search and rescue, wildfire support
- 700 lbf instruments long endurance or 3,000 lbf science payload short endurance

NASA Dryden Flight Research Center Photo Collection
http://www.dfrc.nasa.gov/Gallery/Photo/index.html
NASA Photo: ED06-0208-3 Date: October 25, 2006 Photo By: General Atomics Aeronautical Systems, Inc.

Equipped with a pod-mounted infrared imaging sensor, the Altair UAS aided fire mapping efforts over wildfires in central and southern California in late 2006.

Partner: *General Atomics Aeronautical Systems*

Current Research: X-48B BWB

- 8.5% scale remotely piloted technology demonstrator
- Advanced nacelle placement and design
- Supercritical airfoil shape
- Currently in flight test for validation and verification

NASA Dryden Flight Research Center Photo Collection
http://www.dfrc.nasa.gov/Gallery/Photo/index.html
NASA Photo: ED06-0198-50 Date: October 24, 2006 Photo By: Tony Landis

Boeing's sub-scale X-48B Blended Wing Body technology demonstrator shows off its unique lines on the vast expanse of Rogers Dry Lake adjacent to NASA Dryden.

Partner: *Boeing Phantom Works*

Current Research: ER-2

- High altitude civil U2 derivative, 410 kt at 75,000 ft.
- Can reach 65,000 ft in 20 min, range 6,000+ nm, endurance 10 hrs.
- Earth resources, celestial observations, atmospheric chemistry and dynamics, oceanic processes, electronic sensor R/D, satellite calibration / data validation, hurricane prediction, cloud formation, etc, etc, …
- Numerous spectral and atmospheric measurement partnerships with other NASA centers, USAF, NOAA, EPA, private industry, and universities

Current Research: F-15B Quiet Spike

- Sonic boom mitigation for civilian supersonic business jet application
- Softens boom by passing incoming flow through a series of oblique shocks instead of a single bow shock
- 3-sections, extendable to achieve desired multi-ramp configuration for flight condition

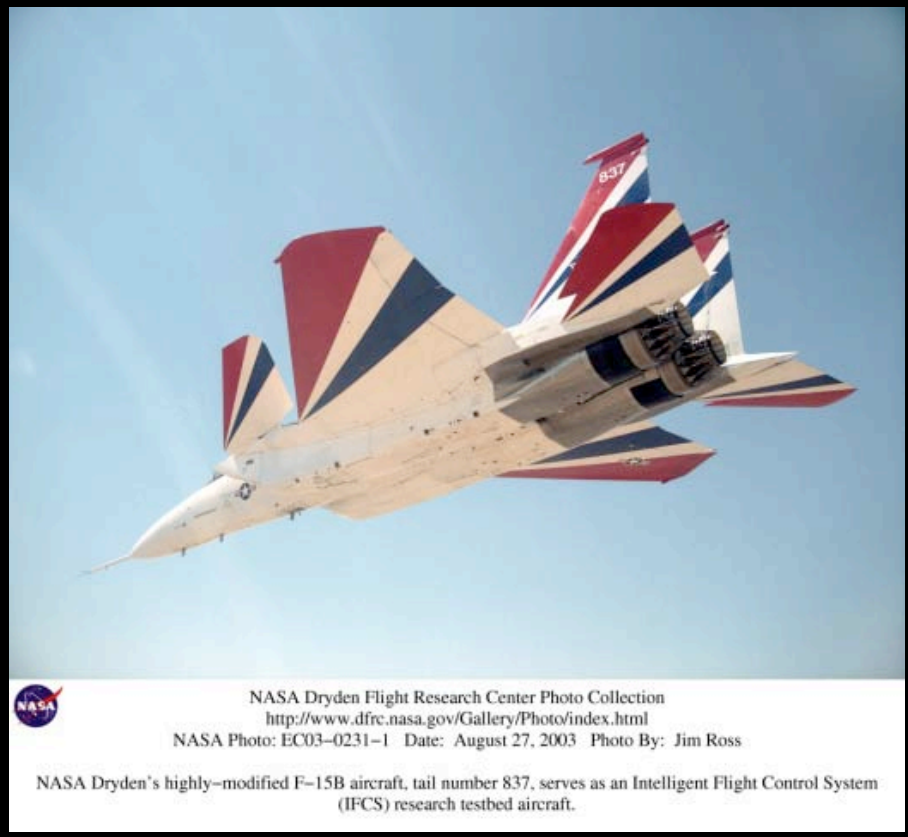
NASA Dryden Flight Research Center Photo Collection
http://www.dfrc.nasa.gov/Gallery/Photo/index.html
NASA Photo: ED06–0111–08 Date: July 6, 2006 Photo By: Tom Tschida

NASA´s F–15B testbed aircraft with Gulfstream Quiet Spike sonic boom mitigator attached.

Partner: *Gulfstream*

Current Research: F-15 IFCS

- Artificially intelligent direct-adaptive neural network controller
- Aviation safety, damaged airframe recovery, pilot augmentation, AI systems research
- Modified pre-production F-15B, canards + thrust vectoring
- Digital failure logic via ARTS-II research controller



NASA Dryden Flight Research Center Photo Collection
http://www.dfrc.nasa.gov/Gallery/Photo/index.html
NASA Photo: EC03-0231-1 Date: August 27, 2003 Photo By: Jim Ross

NASA Dryden's highly-modified F-15B aircraft, tail number 837, serves as an Intelligent Flight Control System (IFCS) research testbed aircraft.

Partners: NASA ARC / ISR / Boeing

Current Research: SOFIA

- Stratospheric Observatory for Infrared Astronomy
- 100” (2.5m) telescope mounted to B747-SP
- Visible light through sub-milimeter far-infrared spectrum
- Mobile: anywhere in the world at any 747 operational altitude
- Advanced: loaded with scientific instruments and optical / spectrometric technology

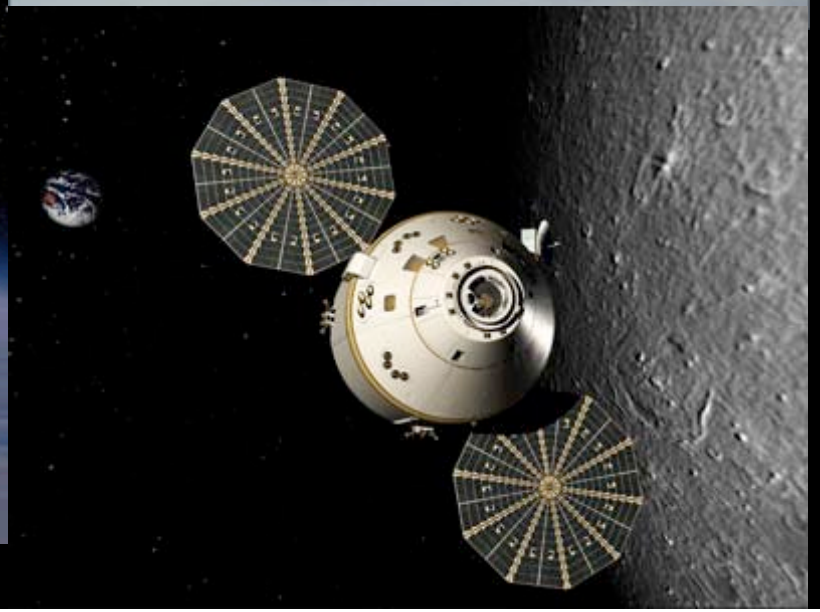
NASA Dryden Flight Research Center Photo Collection
http://www.dfrc.nasa.gov/Gallery/Photo/index.html
NASA Photo: ED06–0192–1 Date: September 25, 2006 Photo By: courtesy L–3 Communications

NASA’s Stratospheric Observatory for Infrared Astronomy 747SP shows off its new blue–and–white livery at L–3 Communications’ Integrated Systems in Waco, Texas.

Partners: L-3 Communications

Deutsches Zentrum für Luft und Raumfährt

VSE / Constellation / Orion

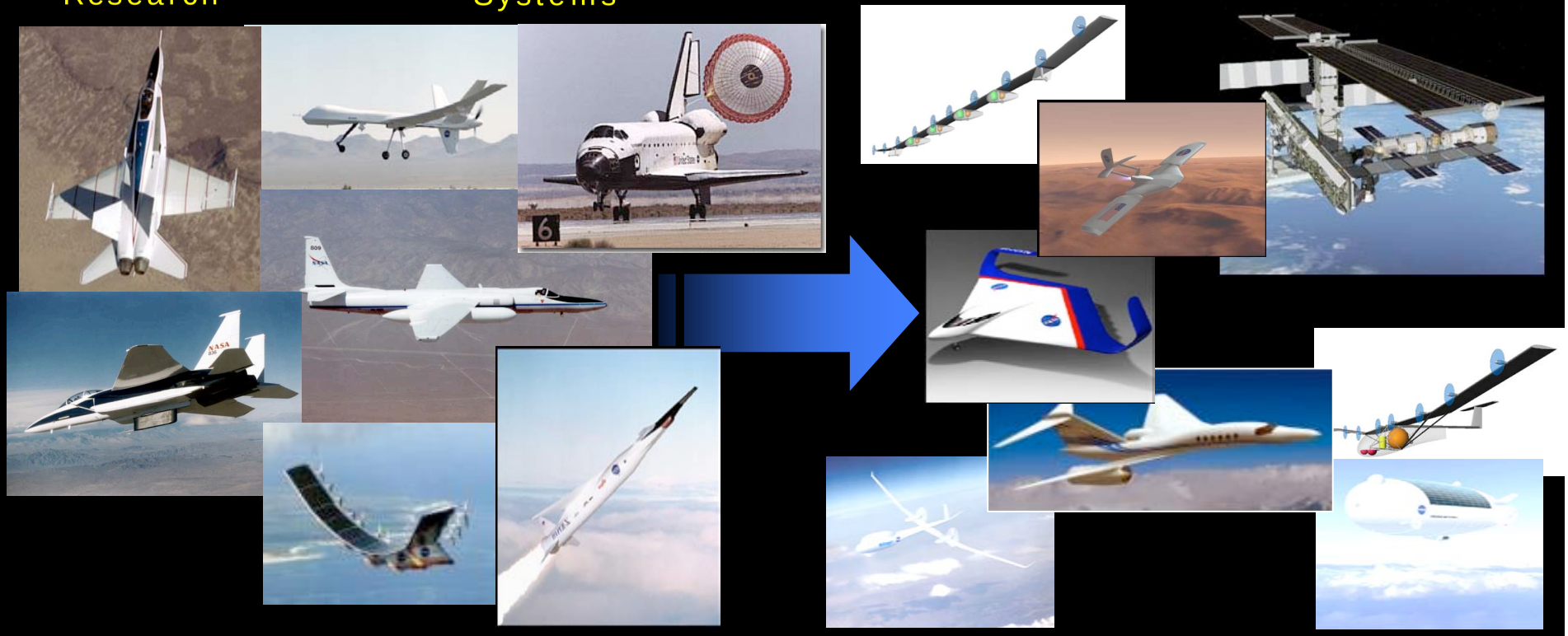


Atmospheric Flight Research and Test

A Competency for Now and the Future

Aeronautics Research

Exploration Systems

Space Operations

Science